

Textbook Alignment to the Utah Core – Physics

This alignment has been completed using an “Independent Alignment Vendor” from the USOE approved list (www.schools.utah.gov/curr/imc/indvendor.html.) Yes **X** No _____

Name of Company and Individual Conducting Alignment: **Robert Arnold**

A “Credential Sheet” has been completed on the above company/evaluator and is (Please check one of the following):

☒ On record with the USOE.

☐ The “Credential Sheet” is attached to this alignment.

Instructional Materials Evaluation Criteria (name and grade of the core document used to align): **Physics Core Curriculum**

Title: **Physics: Principles and Problems © 2009** ISBN#: **0-07-880722-0**

Publisher: **Glencoe/McGraw-Hill Publishing Company**

Overall percentage of coverage in the *Student Edition (SE)* and *Teacher Edition (TE)* of the Utah State Core Curriculum: _____%

Overall percentage of coverage in *ancillary materials* of the Utah Core Curriculum: _____%

STANDARD I: Students will understand how to measure, calculate, and describe the motion of an object in terms of position, time, velocity, and acceleration.

Percentage of coverage in the <i>student and teacher edition</i> for Standard I: _____ %		Percentage of coverage not in student or teacher edition, but covered in the <i>ancillary material</i> for Standard I: _____ %		
OBJECTIVES & INDICATORS		Coverage in <i>Student Edition (SE) and Teacher Edition (TE)</i> (pg #'s, etc.)	Coverage in <i>Ancillary Material</i> (titles, pg #'s, etc.)	<i>Not covered in TE, SE or ancillaries</i> ✓
Objective 1.1: Describe the motion of an object in terms of position, time, and velocity.				
a.	Calculate the average velocity of a moving object using data obtained from measurements of position of the object at two or more times.	Student Edition: 43-47 <i>Physics Lab</i> 48-49 Teacher Wraparound Edition: CU 47; ICE 45; IM 46		
b.	Distinguish between distance and displacement.	Student Edition: 36-37, 66-67 Teacher Wraparound Edition: ICE 67; IM 36		
c.	Distinguish between speed and velocity.	Student Edition: 43-45 <i>Internet Physics Lab</i> 20-21 Teacher Wraparound Edition: CU 47; TPK 43		
d.	Determine and compare the average and instantaneous velocity of an object from data showing its position at given times.	Student Edition: 43-47 <i>Internet Physics Lab</i> 20-21 <i>MiniLab</i> 46 Teacher Wraparound Edition: A 47; IM 46		

e.	Collect, graph, and interpret data for position vs. time to describe the motion of an object and compare this motion to the motion of another object.	Student Edition: 38-42, 43-45, 157-159 Challenge Problem 40 <i>Launch Lab</i> 31 <i>Physics Lab</i> 48-49 Teacher Wraparound Edition: ICE 158; R 41; UM 159		
Objective 1.2: Analyze the motion of an object in terms of velocity, time, and acceleration.				
a.	Determine the average acceleration of an object from data showing velocity at given times.	Student Edition: 58-63, 65-71 <i>Internet Physics Lab</i> 76-77 Teacher Wraparound Edition: CD 59; ICE 60, 63		
b.	Describe the velocity of an object when its acceleration is zero.	Student Edition: 62, 65-67 Teacher Wraparound Edition: CT 59; ICE 67; TPK 57		
c.	Collect, graph, and interpret data for velocity vs. time to describe the motion of an object.	Student Edition: 56-63, 66-71, 72-73 <i>Internet Physics Lab</i> 76-77 <i>Launch Lab</i> 57 Teacher Wraparound Edition: CT 59, 68; ICE 67		

d.	Describe the acceleration of an object moving in a circular path at constant speed (i.e., constant speed, but changing direction).	Student Edition: 153-156 <i>Future Technology</i> 162 Teacher Wraparound Edition: D 155; QD 154		
e.	Analyze the velocity and acceleration of an object over time.	Student Edition: 58-63, 65-70, 72-73, 100-101 <i>Internet Physics Lab</i> 76-77 <i>Launch Lab</i> 57 Teacher Wraparound Edition: CT 59; CU 71; D 62; ICE 60, 63, 67, 70; QD 66; TPK 57		
Objective 1.3: Relate the motion of objects to a frame of reference.				
a.	Compare the motion of an object relative to two frames of reference.	Student Edition: 157-159, 216-217 <i>Extreme Physics</i> 78 Teacher Wraparound Edition: AML 216; CD 157		
b.	Predict the motion of an object relative to a different frame of reference (e.g., an object dropped from a moving vehicle observed from the vehicle and by a person standing on the sidewalk).	Student Edition: 157-159, 216-217 <i>Challenge Problem</i> 157 <i>Extreme Physics</i> 78 Teacher Wraparound Edition: A 149; AML 216; CD 157; ICE 158; UM 159		

c.	Describe how selecting a specific frame of reference can simplify the description of the motion of an object.	Student Edition: 216-217 <i>Applying Physics</i> 180 <i>Extreme Physics</i> 78 <i>Future Technology</i> 162 Teacher Wraparound Edition: AML 216; IM 172		
Objective 1.4: Use Newton's first law to explain the motion of an object.				
a.	Describe the motion of a moving object on which balanced forces are acting.	Student Edition: 94-95, 100-101 Teacher Wraparound Edition: A 93; CB 92; CU 101; IM 90		
b.	Describe the motion of a stationary object on which balanced forces are acting.	Student Edition: 88-89, 92, 94-95 Teacher Wraparound Edition: CD 91; CU 95		
c.	Describe the balanced forces acting on a moving object commonly encountered (e.g., forces acting on an automobile moving at constant velocity, forces that maintain a body in an upright position while walking).	Student Edition: 100-101 <i>Applying Physics</i> 180 <i>Internet Physics Lab</i> 108-109 <i>Technology and Society</i> 220 Teacher Wraparound Edition: CB 92; CU 101; CT 92; D 156; IM 90		

STANDARD II: Students will understand the relation between force, mass, and acceleration.				
Percentage of coverage in the <i>student and teacher edition</i> for Standard II: _____ %		Percentage of coverage not in student or teacher edition, but covered in the <i>ancillary material</i> for Standard II: _____ %		
OBJECTIVES & INDICATORS		Coverage in <i>Student Edition</i> (SE) and <i>Teacher Edition</i> (TE) (pg #'s, etc.)	Coverage in <i>Ancillary Material</i> (titles, pg #'s, etc.)	<i>Not covered in TE, SE or ancillaries ✓</i>
Objective 2.1: Analyze forces acting on an object.				
a.	Observe and describe forces encountered in everyday life (e.g., braking of an automobile-friction, falling rain drops-gravity, directional compass-magnetic, bathroom scale-elastic or spring).	Student Edition: 94, 96-101, 102-107, 154-156, 266-273, 552-553, 648-649, 653 <i>Applying Physics</i> 95 <i>How It Works</i> 110 <i>Internet Physics Lab</i> 76-77, 108-109 <i>MiniLab</i> 103 <i>Physics Lab</i> 136-137 <i>Technology and Society</i> 220, 304 Teacher Wraparound Edition: A 93; AML 101; CB 92; CD 91; CH 183; CT 156; HSS 89; PP 105; QD 100, 653		
b.	Use vector diagrams to represent the forces acting on an object.	Student Edition: 120-125, 131-135, 148-152, 153-155, 236-242, 259-264, 286-289 <i>Physics Lab</i> 136-137 <i>Problem-Solving Strategies</i> 123, 260 Teacher Wraparound Edition: AML 132; ICE 121, 124, 134		

c.	Measure the forces on an object using appropriate tools.	Student Edition: 96-99, 177-178, 183-184 <i>How It Works</i> 110 <i>Internet Physics Lab</i> 108-109 <i>Launch Lab</i> 119 <i>Technology and Society</i> 220 Teacher Wraparound Edition: CB 177; CD 105, 131; CH 97; DI 106; PP 99		
d.	Calculate the net force acting on an object.	Student Edition: 92-95, 100-101, 131-134 <i>Launch Lab</i> 119 <i>Physics Lab</i> 136-137 Teacher Wraparound Edition: AML 132; CB 92; CU 135		
Objective 2.2: Using Newton's second law, relate the force, mass, and acceleration of an object.				
a.	Determine the relationship between the net force on an object and the object's acceleration.	Student Edition: 92-95, 100-101, 131 Teacher Wraparound Edition: CB 92; CD 91, 154; CU 101		
b.	Relate the effect of an object's mass to its acceleration when an unbalanced force is applied.	Student Edition: 93, 96-98, 154-155, 183-184, 208-209 Teacher Wraparound Edition: ICE 97; QD 94		

c.	Determine the relationship between force, mass, and acceleration from experimental data and compare the results to Newton's second law.	Student Edition: 93, 96-98 <i>Internet Physics Lab</i> 76-77 Teacher Wraparound Edition: QD 94		
d.	Predict the combined effect of multiple forces (e.g., friction, gravity, and normal forces) on an object's motion.	Student Edition: 100-101, 126-130, 132-135 <i>Physics Lab</i> 136-137 Teacher Wraparound Edition: ICE 134; QD 100		
Objective 2.3: Explain that forces act in pairs as described by Newton's third law.				
a.	Identify pairs of forces (e.g., action-reaction, equal and opposite) acting between two objects (e.g., two electric charges, a book and the table it rests upon, a person and a rope being pulled).	Student Edition: 102-107, 546-548 <i>How It Works</i> 110 <i>Internet Physics Lab</i> 108-109 <i>MiniLab</i> 103 <i>Problem-Solving Strategies</i> 103 Teacher Wraparound Edition: BA 102; CT 543; E 107; PP 105		
b.	Determine the magnitude and direction of the acting force when magnitude and direction of the reacting force is known.	Student Edition: 102-107, 549-552 <i>Internet Physics Lab</i> 108-109 Teacher Wraparound Edition: CD 105; CU 107; ICE 551; IM 103; QD 551; R 550, 553		

c.	Provide the magnitude and direction of the acting force when magnitude and direction of the reacting force is known.	Student Edition: 102-107, 549-552 <i>Internet Physics Lab</i> 108-109 Teacher Wraparound Edition: CD 105; CU 107; ICE 551; IM 103; QD 551; R 550, 553		
d.	Relate the historical development of Newton's laws of motion to our current understanding of the nature of science (e.g., based upon previous knowledge, empirical evidence, replicable observations, development of scientific law).	Student Edition: 9-10, 93-95, 175-176, 182-183, 184-185, 754-755 <i>Extreme Physics</i> 188, 506 Teacher Wraparound Edition: CB 184; CD 176		
STANDARD III: Students will understand the factors determining strength of gravitational and electric forces.				
Percentage of coverage in the <i>student and teacher edition</i> for Standard III: _____ %		Percentage of coverage not in student or teacher edition, but covered in the <i>ancillary material</i> for Standard III: _____ %		
OBJECTIVES & INDICATORS		Coverage in <i>Student Edition</i> (SE) and <i>Teacher Edition</i> (TE) (pg #'s, etc.)	Coverage in <i>Ancillary Material</i> (titles, pg #'s, etc.)	<i>Not covered in TE, SE or ancillaries</i> ✓
Objective 3.1: Relate the strength of the gravitational force to the distance between two objects and the mass of objects (i.e., Newton's law of universal gravitation).				
a.	Investigate how mass affects the gravitational force (e.g., spring scale, balance, or other method of finding a relationship between mass and the gravitational force).	Student Edition: 175-176, 179-184 Teacher Wraparound Edition: CD 176; QD 183; R 178		

b.	Distinguish between mass and weight.	Student Edition: 96-99, 177-178, 182-185, 802-804 Teacher Wraparound Edition: BA 96; R 185		
c.	Describe how distance between objects affects the gravitational force (e.g., effect of gravitational forces of the moon and sun on objects on Earth).	Student Edition: 175-176, 185-186 Teacher Wraparound Edition: A 162; CT 175; IM 182		
d.	Explain how evidence and inference are used to describe fundamental forces in nature, such as the gravitational force.	Student Edition: 175-176, 182-185, 802, 822-823 <i>Extreme Physics</i> 188 Teacher Wraparound Edition: CB 177, 182; CD 176; R 823		
e.	Research the importance of gravitational forces in the space program.	Student Edition: 179-182 <i>Applying Physics</i> 180, 467 <i>Future Technology</i> 162 Teacher Wraparound Edition: R 180; RLP 154		
Objective 3.2: Describe the factors that affect the electric force (i.e., Coulomb's law).				
a.	Relate the types of charge to their effect on electric force (i.e., like charges repel, unlike charges attract).	Student Edition: 542-543, 546-550 <i>Launch Lab</i> 541 Teacher Wraparound Edition: CT 543; R 553; UA 544		

b.	Describe how the amount of charge affects the electric force.	Student Edition: 549-550 Teacher Wraparound Edition: IM 552		
c.	Investigate the relationship of distance between charged objects and the strength of the electric force.	Student Edition: 549-550 Teacher Wraparound Edition: IM 552; R 550		
d.	Research and report on electric forces in everyday applications found in both nature and technology (e.g., lightning, living organisms, batteries, copy machine, electrostatic precipitators).	Student Edition: 552-553 <i>Applying Physics</i> 570 <i>Future Technology</i> 556 <i>How It Works</i> 582, 634 <i>Physics Lab</i> 580-581 Teacher Wraparound Edition: A 571; CB 572; CH 566, 574		

STANDARD IV: Students will understand transfer and conservation of energy.				
Percentage of coverage in the <i>student and teacher edition</i> for Standard IV: _____ %		Percentage of coverage not in student or teacher edition, but covered in the <i>ancillary material</i> for Standard IV: _____ %		
OBJECTIVES & INDICATORS		Coverage in <i>Student Edition (SE) and Teacher Edition (TE)</i> (pg #'s, etc.)	Coverage in <i>Ancillary Material</i> (titles, pg #'s, etc.)	<i>Not covered in TE, SE or ancillaries</i> ✓
Objective 4.1: Determine kinetic and potential energy in a system.				
a.	Identify various types of potential energy (i.e., gravitational, elastic, chemical, electrostatic, nuclear).	Student Edition: 288-292, 376-378, 802-803 <i>Applying Physics</i> 289 Teacher Wraparound Edition: CB 287; CH 804; CU 292; ICE 377		
b.	Calculate the kinetic energy of an object given the velocity and mass of the object.	Student Edition: 258-260, 287 Teacher Wraparound Edition: CB 259; UA 286		
c.	Describe the types of energy contributing to the total energy of a given system.	Student Edition: 293-295, 314 Teacher Wraparound Edition: CD 294; HSS 296; TPK 314		
Objective 4.2: Describe the conservation of energy in terms of systems.				
a.	Describe a closed system in terms of its total energy.	Student Edition: 236-237, 293-295, 314 Teacher Wraparound Edition: CD 294; HSS 296; TPK 314		

b.	Relate the transformations between kinetic and potential energy in a system (e.g., moving magnet induces electricity in a coil of wire, roller coaster, internal combustion engine).	Student Edition: 294-295, 297-301, 326-328 <i>Physics Lab</i> 302-303 <i>Problem-Solving Strategies</i> 295 <i>Technology and Society</i> 138 Teacher Wraparound Edition: CB 298; HSS 296; IM 326		
c.	Gather data and calculate the gravitational potential energy and the kinetic energy of an object (e.g., pendulum, water flowing downhill, ball dropped from a height) and relate this to the conservation of energy of a system.	Student Edition: 289-292, 293-295 <i>Physics Lab</i> 302-303 <i>Problem-Solving Strategies</i> 295 Teacher Wraparound Edition: BA 293; CB 298; CD 294; HSS 296; QD 295		
d.	Evaluate social, economic, and environmental issues related to the production and transmission of electrical energy.	Student Edition: 603-604 <i>How It Works</i> 634 Teacher Wraparound Edition: CB 599; CT 602; D 603; RLP 630		
Objective 4.3: Describe common energy transformations and the effect on availability of energy.				
a.	Describe the loss of useful energy in energy transformations.	Student Edition: 268, 294-296, 326-331 <i>Challenge Problem</i> 300 <i>Launch Lab</i> 285 <i>Technology and Society</i> 304 Teacher Wraparound Edition: AP 379; BA 293; CD 327; IM 326		

b.	Investigate the transfer of heat energy by conduction, convection, and radiation.	Student Edition: 315, 317, 320 <i>Astronomy Connection</i> 725 Teacher Wraparound Edition: AP 725; TPK 314		
c.	Describe the transformation of mechanical energy into electrical energy and the transmission of electrical energy.	Student Edition: 592-593, 603-604, 675-678 Teacher Wraparound Edition: CB 599; CD 675; CT 602; D 603; RLP 630; RWP 687		
d.	Research and report on the transformation of energy in electrical generation plants (e.g., chemical to heat to electricity, nuclear to heat to mechanical to electrical, gravitational to kinetic to mechanical to electrical), and include energy losses during each transformation.	Student Edition: 592-593, 603-604, 675-678, 812-813 Teacher Wraparound Edition: CB 599; CD 675; CT 602; D 603; E 605; RLP 630; RWP 687		

STANDARD V: Students will understand the properties and application of waves.				
Percentage of coverage in the <i>student and teacher edition</i> for Standard V: _____ %		Percentage of coverage not in student or teacher edition, but covered in the <i>ancillary material</i> for Standard V: _____%		
OBJECTIVES & INDICATORS		Coverage in <i>Student Edition (SE) and Teacher Edition (TE)</i> (pg #'s, etc.)	Coverage in <i>Ancillary Material</i> (titles, pg #'s, etc.)	<i>Not covered in TE, SE or ancillaries</i> ✓
Objective 5.1: Demonstrate an understanding of mechanical waves in terms of general wave properties.				
a.	Differentiate between period, frequency, wavelength, and amplitude of waves.	Student Edition: 375, 382-385 <i>Design Your Own Physics Lab</i> 392-393 <i>Physics Lab</i> 420-421 Teacher Wraparound Edition: CD 385; CU 410; PP 382; R 386		
b.	Investigate and compare reflection, refraction, and diffraction of waves.	Student Edition: 390-391, 439-442, 458-463, 464-473, 485-491, 493-499, 524-531 <i>Launch Lab</i> 485 <i>Physics Lab</i> 474-475 Teacher Wraparound Edition: AML 471, 527; BA 439; CB 467; CD 494; CT 461; CU 531; HSS 490; QD 459; R 390, 525; TPK 464, 493; UA 488; UM 458		

c.	Provide examples of waves commonly observed in nature and/or used in technological applications.	Student Edition: 381-382, 404-410, 412-419, 705-713, 760-765 <i>Biology Connection</i> 410 <i>Design Your Own Physics Lab</i> 392-393 <i>Future Technology</i> 768 <i>Physics Lab</i> 420-421 <i>Technology and Society</i> 394, 716 Teacher Wraparound Edition: AP 413; D 764; IM 710; PP 382, 711; QD 707; R 713; RLP 383, 389, 416		
d.	Identify the relationship between the speed, wavelength, and frequency of a wave.	Student Edition: 382-386, 390-391, 407-410, 445-447 <i>Extreme Physics</i> 422 <i>Physics Lab</i> 420-421 Teacher Wraparound Edition: CB 385; CU 391; ICE 385, 409; QD 382; R 386, 390, 446		
e.	Explain the observed change in frequency of a mechanical wave coming from a moving object as it approaches and moves away (i.e., Doppler effect).	Student Edition: 407-410 <i>Extreme Physics</i> 422 Teacher Wraparound Edition: CD 407; E 410; ICE 409; QD 408		
f.	Explain the transfer of energy through a medium by mechanical waves.	Student Edition: 382-386, 405 Teacher Wraparound Edition: BA 403; CB 409; CT 383; UA 404		

Objective 5.2: Describe the nature of electromagnetic radiation and visible light.				
a.	Describe the relationship of energy to wavelength or frequency for electromagnetic radiation.	Student Edition: 712, 713, 727-731 <i>Problem-Solving Strategies</i> 728 Teacher Wraparound Edition: R 706		
b.	Distinguish between the different parts of the electromagnetic spectrum (e.g., radio waves and x-rays or visible light and microwaves).	Student Edition: 708, 712-713 Teacher Wraparound Edition: CB 710; PP 711; QD 707		
c.	Explain that the different parts of the electromagnetic spectrum all travel through empty space and at the same speed.	Student Edition: 706 Teacher Wraparound Edition: R 713		
d.	Explain the observed change in frequency of an electro-magnetic wave coming from a moving object as it approaches and moves away (i.e., Doppler effect, red/blue shift).	Student Edition: 445-447 <i>Astronomy Connection</i> 447 Teacher Wraparound Edition: R 446		

e.	Provide examples of the use of electromagnetic radiation in everyday life (e.g., communications, lasers, microwaves, cellular phones, satellite, dishes, visible light).	Student Edition: 708-713, 786 <i>Future Technology</i> 476 <i>How It Works</i> 534 <i>Technology and Society</i> 450, 716 Teacher Wraparound Edition: A 442; AP 787; CB 699; CH 785; CT 708; IM 710; QD 707; R 444; RLP 779		
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